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# Viewshed Analysis



## Foote Creek Rim 1 Wind Energy Project Carbon County, Wyoming



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October 17, 2018

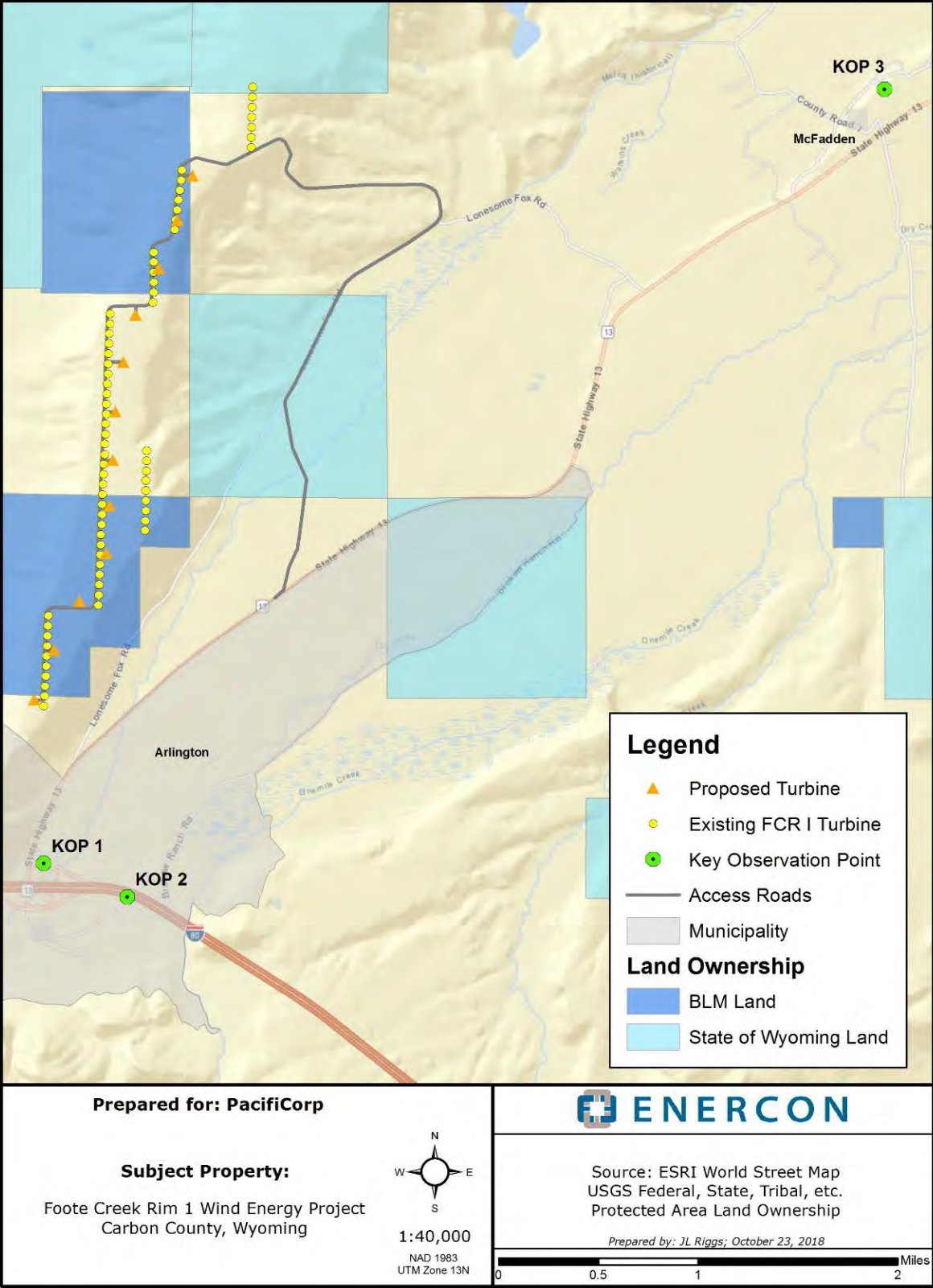
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## Introduction

Enercon Services, Inc. (ENERCON) completed a Static Photo Simulation of the proposed Foot Creek Rim I Wind Energy Project (Project) located in Carbon County, Wyoming for PacifiCorp (Applicant). The proposed Project is situated on an existing company-owned wind energy facility, Foot Creek Rim I, which is located on a combination of BLM, State of Wyoming, and privately owned land (Figure 1). Within a 10-mile radius, also known as the project vicinity, there are two communities. The nearest community is Arlington, which is a census designated place located adjacent to the Project to the south. The second, smaller community, McFadden, is located east of the Project approximately 3.5 miles. The nearest large city is Laramie, Wyoming located approximately 36 mile southeast.

The existing facility includes 68 turbines with a capacity of 600-kW and an approximate turbine height of 187 feet AGL. The proposed project would replace these turbines with 12 new, more efficient wind turbines, ranging in nameplate capacity from 2.0 MW to 4.2 MW. Four of the new turbines will have a maximum height (including tower and rotor) of 427 feet above ground level (AGL) and eight of the new turbines will have a maximum height of 492 feet AGL. Figure 1 presents the proposed and existing turbine layouts at the Project site as well as the municipalities within the vicinity. The replacement of the existing turbines with the proposed turbines is anticipated to significantly reduce the visual impacts of the Project.

Figure 1. General Vicinity of Foot Creek Rim I Wind Energy Project



## Methodology

The evaluation of potential impacts to the visual aesthetics within the proposed project was completed using the evaluation process defined in the U.S. Department of Interior – Bureau of Land Management (BLM) Visual Resource Contrast Rating Manual 8431 (BLM 1986). Using this method, ENERCON completed the three steps:

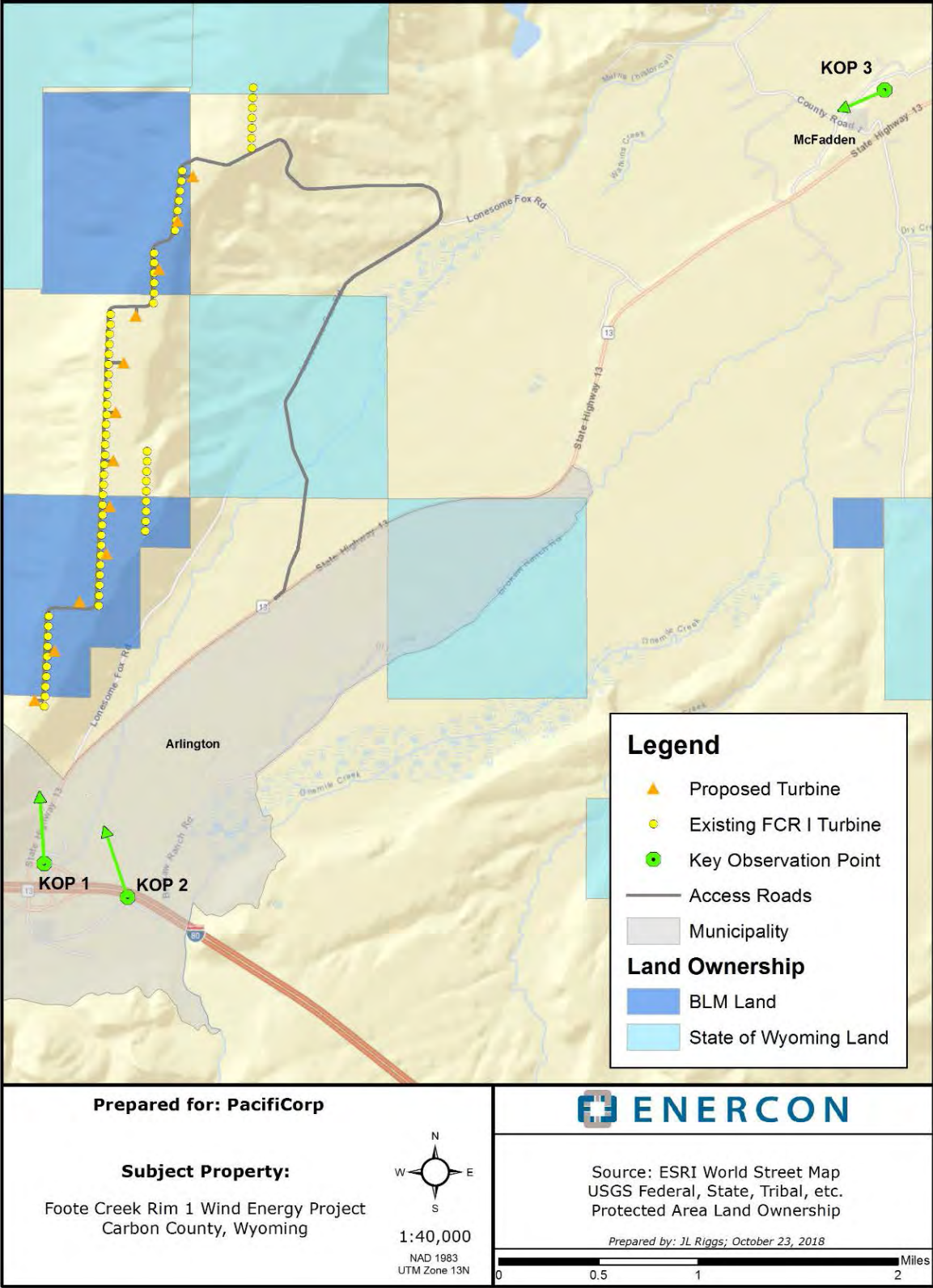
1. Select Key Observation Points (KOPs) along most critical viewpoints within the area to be evaluated. This included consideration of local residential areas, critical viewpoints, and any special landscape or Project features.
2. Prepare visual simulations of the KOPs.
3. Complete a contrast analysis from the KOP reviewing the following criteria:
  - a. Distance of the KOP from the Project.
  - b. Angle of observation and light conditions.
  - c. Length of time and seasons that the Project would be in view from the KOP.
  - d. Spatial relations of existing features within the landscape to the Project.
  - e. Motion of features that could be visible.

KOPs were selected within a 10-mile (16-km) radius and photographs were taken. The KOPs were chosen at locations where views of the Project were most typical of project components, or most visible to the public. No legally defined sensitive receptors, such as scenic overlooks or other recreational locations were identified within 10-miles of the Project. Therefore, the KOPs were chosen to reflect typical views of project components for the public (Figure 2).

ENERCON completed photographic simulations of each selected KOP to convey the overall perception of viewshed changes associated with the Project. These photographs estimate the scale, extent, and other Project characteristics relative to the surrounding landscape features. The proposed Project drastically reduces the number of turbines from 68 to 12, an approximately 80% reduction; however, the proposed turbines are anticipated to be constructed prior to the decommissioning of the existing turbines. To illustrate this scenario, simulations of each KOP was developed to show how the landscape would appear with both the existing and proposed turbines and also with only the proposed turbines. The KOP photographs were taken on August 16, 2018 from a height of approximately 5 feet (1.5 meters).



Figure 2. Key Observation Points



## Key Observation Points

### KOP 1

Latitude: 41.599547 (NAD 83)

Longitude: -106.208361 (NAD 83)

Elevation: 7,693 ft (2,345 m)

KOP 1 is located within the census designated place (CDP) of Arlington at the Interstate 80 west-bound off ramp east of where it connects to north-south State Highway 13, overlooking the southern extent of the Project site. The surrounding land use is mixed, with a combination of residential and developed lands (e.g., transportation corridors) that is combined with sparsely vegetated native landscapes adjacent to the Project site; thus, there are minimum obstructions looking towards the Project located on top of the nearby range of hills. Based on the Visual Resource Contrast Rating Manual 8431, the element contrast of this location is moderate in that the Project can clearly be seen and does begin to draw attention from the surrounding landscape. From the camera angle at this KOP, multiple turbines are visible. The nearest proposed turbine is located approximately 4,343 feet (0.8 miles) north with a base elevation of 7,972 ft (2,430 m).

### KOP 2

Latitude: 41.597204 (NAD 83)

Longitude: -106.20022 (NAD 83)

Elevation: 7,662 ft (2,335 m)

KOP 2 is located within the CDP of Arlington along an exit road on the south side of Interstate 80 overlooking the southern extent of the Project site. The surrounding land use of the KOP includes a mix of developed land use, utilized for transportation corridors and commercial properties, and undeveloped lands. The existing structures and an area of trees and vegetation located north of Interstate 80 provide partial visual obstruction to the Project, located on top of the nearby range of hills. Based on the Visual Resource Contrast Rating Manual 8431, the element contrast of this location is weak. Specifically, the Project can be seen but does not draw attention. From this KOP one proposed turbine will be visible. This proposed turbine is located approximately 5,772 ft (1.09 miles) north northwest with a base elevation of 7,972 ft (2,430 m).

### KOP 3

Latitude: 41.656598 (NAD 83)

Longitude: -106.127956 (NAD 83)

Elevation: 7,265 ft (2,214 m)

KOP 3 is located in the community of McFadden, north of State Highway 13, at the corner of Driller Drive and Derrick Drive overlooking the north central portions of the Project site. The surrounding land use is residential, combined with vegetated native landscapes adjacent to the Project site; thus, there are minimum obstructions toward the Project. Based on the Visual Resource Contrast Rating Manual 8431, the element contrast of this location is weak in that the Project is located on a range of hill tops at a significant distance away from McFadden and the element contrast can be seen but does not attract attention from the surrounding landscape. From

the camera angle at this KOP, multiple turbines are visible. The nearest proposed turbine is located approximately 18,461 ft (3.5 miles) west with a base elevation of approximately 7,776 ft (2,370 m).

## Project Impacts

Project effects on the visual quality from each KOP are described below. The anticipated reduction of visual impacts associated with reducing the existing 68 turbines and replacing them with 12 more efficient turbines are also detailed.

### Impacts on View from KOP 1

A photograph representing the viewshed from KOP 1 is provided as Figure 3a. The simulated view of the proposed Project site from KOP 1 is illustrated as Figure 3b. The simulated view of the proposed Project site with both the proposed and existing turbines is provided in Figure 3c, to provide context between the visual effects of the existing and proposed turbines. From this location, multiple proposed turbines are visible based on the current angle and weather conditions. Two of the turbines are more dominant, whereas the remaining turbines in the viewshed are less dominant as distances increase. Furthermore, the view of the turbines may be impacted by the angle of observation, light conditions and season of use. Because the proposed turbines associated with this Project are replacing several existing turbines, the overall viewshed will remain relatively consistent and the visual contrast due to the proposed Project does not alter the character of the view.

### Impacts on View from KOP 2

A photograph representing the viewshed from KOP 2 is provided as Figure 4a. The simulated view of the proposed Project site from KOP 2 is illustrated as Figure 4b. The simulated view of the proposed Project site with both the proposed and existing turbines is provided in Figure 4c, to provide context between the visual effects of the existing and proposed turbines. From this location, the southernmost proposed turbine would be clearly visible based on the current angle and weather conditions. The existing structures and an area of trees and vegetation located north of Interstate 80 provide partial visual obstruction to the Project. When compared to the viewshed effects of the existing site, the visual effects from the proposed turbine replacement would be lessened with the reduction in number of turbines. Because of the existing use of the Project site and the associated structures at this KOP, the visual contrast due to the proposed Project does not alter the character of the view.

### Impacts on View from KOP 3

A photograph representing the viewshed from KOP 3 is provided as Figure 5a. The simulated view of the proposed Project site from KOP 3 is illustrated as Figure 5b. The simulated view of the proposed Project site with both the proposed and existing turbines is provided in Figure 5c, to provide context between the visual effects of the existing and proposed turbines. Multiple proposed turbines will be visible from the KOP and their presence will draw minimal attention from the surrounding landscape. At the current distance to the nearest proposed turbine, approximately 3.5 miles, the view of the proposed turbine string from this location may also vary due to the angle of observation, light conditions and season of use. Because the Project is reducing the total number of existing turbines, the overall undeveloped viewshed will remain primarily intact and there will only be a slight reduction to the viewshed due to the larger height of the proposed turbine designs.



Figure 3a. Photograph from KOP 1





Figure 3b. Simulated View of the Proposed Project Site from KOP 1



Figure 3c. Simulated View of the Project Site from KOP 1 Illustrating the Existing and Proposed Turbines





Figure 4a. Photograph from KOP 2



Figure 4b. Simulated View of the Proposed Project Site from KOP 2





Figure 4c. Simulated View of the Project Site from KOP 2 Illustrating the Existing and Proposed Turbines



Figure 5a. Photograph from KOP 3





Figure 5b. Simulated View of the Proposed Project Site from KOP 3





Figure 5c. Simulated View of the Project Site from KOP 3 Illustrating the Existing and Proposed Turbines





## References

U.S. Department of Interior Bureau of Land Management (BLM). 1986. Visual Resource Contrast Rating Manual (Manual 8431). Retrieved from < <https://www.blm.gov/download/file/fid/20550>> (accessed 9/11/18).